Metals in Modern Power Plants SOV/1978

Metals VTI participated in the research: D.N. Vidman, R.Ye. Mazel', V.F. Zlepko, A.I. Zakhanova, V.G. Zelenskiy, L.G. Leonova, Engineers; A.I. Sekt, V.N. Gulyayev, Junior scientific workers; L.A. Ilyutina, Ye.P. Denisova, L.Ye. Kornilova, Senior technicians. The behavior of steel used for building machinery and accessories for modern heat power plants with high and superhigh pressure is described and discussed. There are no references.

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Laguntsov, I.N., and A.Z. Kontorovskiy, Candidates of Technical Sciences. Changes in the Structure and Properties of Steel in Equipment of Heat Power Plants During Service 5
Changes in the properties of steel depending on initial structure and on degree of spheroidization of pearlite are discussed. The effect of pressure, temperature, time, and stress is also considered.

Laguntsov, I.N., P.M. Gura, Candidates of Technical Sciences; and T.A. Mikhaylova, Engineer. Behavior of Austenitic Steel 1kh14N14V2M (EI257) in Modern Heat Power Plants 33

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The steel under discussion belongs to the group of chromium-nickel heat-resistant steels with addition of tungsten and molybdenum. Its composition and properties are presented and the behavior of this steel in two steam power plants is described. No damage was found in walls 17 to 18 mm. thick; in walls 32-38 mm. thick ring-type cracks were found

Ratner, A.V., Candidate of Technical Sciences. Metal for Accessories of Heat Power Plants of High and Superhigh Pressure 54
The author discusses the usefulness of materials, mainly steels, for making parts of pipe fittings, valves, etc. Mechanical wear and erosion cavitation of parts, joining to piping, depositing carbide alloys on sealing surfaces, proposals for improving parts, and increasing the reliability of accessories are covered.

AVAILABLE: Library of Congress (TA473.07)

GO/ad
7-27-59

Card 3/3

S/137/62/000/004/106/201
A052/A101

18.8200

AUTHORS: Laguntsov, I. N., Svyatoslavov, V. K.

TITLE: The effect of a complex-stressed state and the steam medium on the long-time strength of pipes

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 36, abstract 4I206 (V sb. "Ekspluatats. nadezhnost' metalla parosilovykh ustanovok". Moscow-Leningrad, Gosenergoizdat, 1959, 62-75)

TEXT: The results of comparative long-time strength tests of austenite heat-resisting 1Х13Н18В2Б (ЭИ695) [1Kh13N18V2B (EI695)] steel in a monoaxial and complex-stressed state are reported. The long-time strength of pipes in a complex-stressed state was determined on a special installation permitting the test of steam superheating pipes (32 x 5.5 mm) under the pressure of steam coming inside the pipe form a high-parameter boiler with intial parameters 300 at at 600°C. The layout of the installation is presented. The testing temperature of EI695 steel was 700°C. The long-time strength of steel at monoaxial tension was determined on ИП-2 (IP-2) machines. Various previously suggested relations for determining the ultimate long-time strength are analyzed. It is shown that

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The effect of a complex-stressed ...

S/137/62/000/004/106/201
A052/A101

for the strength calculations of pipes of boiler installations it is expedient to use the formula based on the third theory of strength

$$\sigma = (1/200) \cdot [(\beta + 1)/(\beta - 1)] \cdot p$$

where β is the ratio of the external diameter of the pipe to its internal diameter and p is the internal pressure. The long-time strength of samples tested under conditions of a complex-stressed state is noticeably lower than the long-time strength obtained when testing the same material under conditions of monoaxial tension. Depending on testing conditions (wall thickness, duration) various kinds of failures occur: along the grain, intergrain and mixed ones. A metallographic investigation has shown that there are cracks both on the inside and outside surfaces of pipes. There are 10 references.

Z. Fridman

[Abstracter's note: Complete translation]

Card 2/2

36446
S/137/62/000/003/123/191
A060/A101

AUTHORS: Laguntsov, I. N., Fedotova, L. I.

TITLE: On the effect of temperature variation upon the endurance of steel 12Kh1MF (12KhMF)

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 28, abstract 3I168 (V sb. "Ekspluatats. nadezhnost' metalla parosilovykh ustanovok". Moscow - Leningrad, Gosenergoizdat, 1959, 83-89)

TEXT: An investigation was carried out on specimens of boiler steel 12KhMF, cut out from a steam pipe with 173 x 32 mm diameter after normalizing at 960 - 980°C and subsequent tempering at 740 - 760°C. The endurance tests were carried out on MP-2 (IP-2) machines at the rated temperature of 565°C and stresses of 15, 18, and 20 kg/mm². Besides tests at constant and varying temperatures at 565, 575 (variation 10°C), 590 (variation 25°C), and 615°C (variation 50°C), combined tests were carried out: after testing the specimens for a definite period of time at the rated temperature, they were heated up to a higher temperature (the variation prescribed) and were brought up to failure. In each series of tests the duration of the soaking at the rated temperature

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(before increasing up to a higher temperature) constituted 75, 50, and 25% of the time till failure at 565°C. The creep curves during the transition to the higher temperature sharply change their slope, and this the more sharply, the greater is the size of the temperature variation. It is noted that the ductility of the 12KhMF steel under combined tests is practically not lowered at all. An investigation of the possibility of applying the Larson-Miller temperature-time dependence for estimating the effect of temperature variations has shown that when the value of the coefficient C is correctly chosen this dependence is valid. It is confirmed that the value of C varies between wide limits as a function of varying the testing conditions (in the tests carried out C varies between 15 and 27). As the criterion for the correct choice of the value of C it is proposed to apply the condition of coincidence of the endurance limits determined by the parametric and the classical methods.

Z. Fridman

[Abstracter's note: Complete translation]

S/137/62/000/003/146/191
A052/A101

AUTHORS: Gulyayev, V. N., Laguntsov, I. N.

TITLE: Joints of mated metal parts at oxidation

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 78-79, abstract 31504 (V sb. "Ekspluatats. nadezhnost' metalla parosilovych ustanovok". Moscow-Leningrad. Gosenergoizdat, 1959, 106-115)

TEXT: In the process of formation of a common oxide layer in the gaps between fixed steel parts, joints appear the strength of which depends on the chemical composition of the steel, the size of the gaps and the conditions of oxidation: temperature, time and the kind of the oxidizing medium. The application of special lubricants is necessary which prevent the hardening of oxide films, reduce the strength of the common oxide layer in the gaps, and lower the steel-on-steel coefficient of friction. The developed methods of determining the strength properties of oxide films can be used for investigating the heat-resistance of steel and alloys. The possibilities of increasing the service reliability of safety valves are considered. There are 5 references.

N. Yudina

[Abstracter's note: Complete translation]

Card 1/1

LAGUNTSOV, I.N.

PHASE I BOOK EXPLOITATION SOV/3559

Akademiya nauk SSSR. Institut metallurgii. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, t. 5 (Investigations of Heat-Resistant Alloys, Vol 5) Moscow, Izd-vo AN SSSR, 1959. 423 p. Errata slip inserted. 2,000 copies printed.

Ed. of Publishing House: V.A. Klimov; Tech. Ed.: I.F. Kuz'min; Editorial Board: I.P. Bardin, Academician, G.V. Kurdyumov, Academician, N.V. Ageyev, Corresponding Member, USSR Academy of Sciences (Resp. Ed.), I.A. Oding, I.M. Pavlov, and I.F. Zudin, Candidate of Technical Sciences.

PURPOSE: This book is intended for metallurgical engineers, research workers in metallurgy, and may also be of interest to students of advanced courses in metallurgy.

COVERAGE: This book, consisting of a number of papers, deals with the properties of heat-resisting metals and alloys. Each of the papers is devoted to the study of the factors which affect the properties and behavior of metals. The effects of various elements such as Cr, Mo, and V on the heat-resisting properties of various alloys are studied. Deformability and workability of certain metals as related to the thermal conditions are the object of another study described. The problems of hydrogen embrittlement, diffusion and the deposition of ceramic coatings on metal surfaces by means of electrophoresis are examined. One paper describes the apparatus and methods used for growing monocrystals of metals. Boron-base metals are critically examined and evaluated. Results are given of studies of interatomic bonds and the behavior of atoms in metal. Tests of turbine and compressor blades are described. No personalities are mentioned. References accompany most of the articles.

Lanskaya, K.A., R.M. Kireyeva, and E.N. Gorchakova. EI 736 Austenitic Steel 19

Khimushin, F.F., Z.A. Sheyankova, O.Ya. Moskalenko, N.K. Karpich, and B.E. Lyubinskiy. EI696 and EI 696A Heat-Resistant Chromium-Nickel-Titanium Steel 25

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4/5

SOV/96-59-7-12/26

AUTHORS: Laguntsov, I.N., Candidate of Technical Sciences, and Svyatoslavov, V.K., Engineer

TITLE: Long-term Strength Tests on Super-heater Tubes of Steel 12-KhMF (Ispytaniye paroperegrevatel'nykh trub iz stali 12KhMF na dlitel'nuyu prochnost')

PERIODICAL: Teploenergetika, 1959, Nr 7, pp 55-59 (USSR)

ABSTRACT: Boiler materials are often selected by laboratory tensile tests, although in service the components are subject to complex stressing. This article gives comparative long-term strength -test data on super-heater tubes made of steel grade 12KhMF with both simple tension and complex stressing. The nominal outside and inside diameters were 32 and 20 mm. The steel analysis is as follows: C = 0.11%; Mn = 0.56%; Si = 0.27%; Cr = 1.11%; Mo = 0.35%; V = 0.22%; S = 0.023%; P = 0.019%. The heat-treatment of the tubes is described; the structure is of pearlite and ferrite. Mechanical test results are given and it is claimed that the steel meets existing technical requirements. Two types of tests were made on tubes; stressing by internal steam pressur and ordinary tests in simple tension. A special test rig

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Long-term Strength Tests on Super-heater Tubes of Steel 12-KhMF

was built, steam being obtained from a main steam pipe at a pressure of about 300 atm. Continuous steam flow through the specimens was not used but they were blown through three times a day so that the steam was active and corrosion products were removed. The tubes were heated in a vertical muffle furnace. The temperature control and measuring arrangements are described. The specimens were 250 mm long and were carefully selected for size and concentricity. The stresses applied during the tests with internal pressure were from 11.5 to 19 kg/mm^2. The stresses acting on the tube wall were varied by altering the wall thickness from 1.8 to 3.1 mm. The test temperature was 590°C, maintained for periods of 3 000 - 4 000 hours. At the same time similar tubes were tested in simple tension, at the same temperature with tensile stresses ranging from 15 to 25 kg/mm^2; the shape and dimensions of these specimens are shown in Figure 1. Creep curves under tensile stress are shown in Figure 2. The results of long-term strength tests are tabulated, and plotted in Figure3. This graph includes results from two different batches of steel and indicates good agreement between the results of tensile tests on cylindrical and tubular specimens. Data obtained during long-term tests on tubes with internal pressure are given in Table 1. Corresponding stress values

Long-term Strength Tests on Super-heater Tubes of Steel 12-KhMF

calculated by different formulae (1) (2) and (3) are given in Table 2. The appearance of a specimen that has failed after a long time is shown in Figure 4. Test results on tubular specimens with internal steam pressure are plotted in Figure 5, which includes for comparison the results of tensile tests on the same tubes. It will be seen that when plotted on double logarithmic paper the experimental points fall on straight lines; evidently the stress-time relationship is of the same kind in both tensile and internal pressure tests and can be represented by an equation of the type of (4). If the stresses are calculated by equation (1) the experimental points corresponding to tube failure as a result of internal pressure are such that the coefficient B in equation (4) is 20% less than the corresponding figure for tensile tests. If formula (2) is used the coefficient B is 10 - 12% less than in tensile tests. This difference is attributed to the corrosive influence of steam on the specimen. Metallographic investigation of the specimens tested with internal steam pressure showed that the pearlite structure had been somewhat altered. On the internal surface fine cracks

Long-term Strength Tests on Super-heater Tubes of Steel 12-KhMF

were found along the grain boundaries and are attributed to corrosion by the steam. It is concluded that the difference between plain tensile and internal pressure tests should be allowed for in practical calculations. There are 5 figures, 2 tables and 5 references, 3 of which are Soviet and 2 German.

ASSOCIATION: Vsesoyuznyy teplotekhnicheskiy institut (All-Union Thermo-Technical Institute)

SOV/96-59-9-10/22

AUTHORS: Laguntsov, I.N. (Candidate of Technical Sciences) and Fedotova, L.I. (Engineer)

TITLE: The Long-term Strength of Boiler Steels under Variable Temperature Conditions

PERIODICAL: Teploenergetika, 1959, Nr 9, pp 57-63 (USSR)

ABSTRACT: Existing methods of calculating the strength of parts operating under creep conditions are based on permissible stresses at constant temperatures. In practice, the temperature may be very variable, as in starting up boilers. The materials investigated were steam/water tubes of steel 12KhMF, 273 x 32 mm diameter, and steel 1Kh18N12T, 219 x 27 mm diameter. The chemical composition, heat treatment, and mechanical properties of the steel are given in Table 1. Steel 12KhMF consists of ferrite and pearlite, and steel 1Kh18N12T is of normal austenitic structure. The long-term strength tests were made on normal cylindrical specimens 10 mm diameter and 100 mm long. The first stage consisted of preliminary tests at constant temperature, and the results are given in Table 2. A temperature of 565 °C was chosen as normal for steel 12KhMF and 600 °C for steel 1Kh18N12T. Most of the tests were made at these temperatures to obtain reliable data

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The Long-term Strength of Boiler Steels under Variable Temperature Conditions

for the ultimate strength at 100 000 hours. Fewer tests were made at higher temperatures because the long-term strength of both steels is already very well known. At other temperatures agreement with published data was satisfactory. The different types of temperature cycling used are described and typical temperature cycle graphs are illustrated diagrammatically in Fig 1. The results of tests at variable temperatures are given in Table 3. It will be seen that overheating reduces the long-term strength of steel, particularly as the temperature and the time are increased. The plasticity at failure is practically the same as in constant-temperature tests. The methods used to work out the results and to summate the loss of life at different temperatures are explained. Existing methods of determining the time to failure under variable temperature conditions require complicated analytical calculations, and simpler and more convenient procedures are required. The procedure evolved for evaluating the influence of temperature cycling made use of the parametric relationship proposed

The Long-term Strength of Boiler Steels under Variable Temperature Conditions

by Larson and Miller. This involves Eq (1), to determine the time to failure at one temperature from test data obtained at another temperature. This formula can be used to translate to a reference temperature exposure times at another temperature. A graphical method of working out the results was used, auxiliary lines being drawn on the parametric graph according to the temperature stages of the long-term strength test. The results of constant temperature tests were used to construct generalised parametric relationships of the type shown graphically in Fig 2 for steel 12KhMF. The rectangles on Fig 2 indicate the limits of scatter of the long-term strength tests results at variable temperatures. The corresponding numerical values are given in Table 4. Analysis of the graphs given in Fig 1 and the data in Table 4 shows that the test results at variable temperature coincide satisfactorily with the generalised straight line. Therefore, the parametric relationship may be used to evaluate the influence of overheating on the long-term strength. The weak point in the method is the selection of the coefficient c in Eq (1), and

The Long-term Strength of Boiler Steels under Variable Temperature Conditions

after some consideration of this point it is recommended to use values of c from 21 to 27 for steel 12KhMF and from 8 to 19 for steel 1Kh18N12T. It is evident that the value of 20 recommended by Larson and Miller should not be used for all materials. A graphical method was developed to determine the time to failure and long-term ultimate strength under variable temperature conditions. The procedure is explained and the generalised diagrams for the two steels examined are given in Figs 3 and 4. It is claimed that the graphical method has the advantages of simplicity and convenience in finding the time to failure at variable temperature by means of nomograms; moreover, the long-term ultimate strength can easily be determined. When using the graphical method it is not necessary to know the shape of the

The Long-term Strength of Boiler Steels under Variable Temperature Conditions

temperature cycle accurately provided that the time at each temperature is known.

Card 5/5 There are 4 figures, 4 tables and 4 references, of which 1 is English, 1 Soviet, 1 German and 1 Czech.

ASSOCIATION: Vsesoyuznyy teplotekhnicheskiy institut (All-Union Thermo-Technical Institute)

LAGUNTSOV, I.N., kand.tekhn.nauk; ZLEPKO, V.F., inzh.

Aging of austenite boiler steels of the types 1Kh18N12T, EI-695R and EI-257. Teploenergetika no.4:38-42 Ap '60. (MIRA 13:8)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Steel)

S/122/60/000/004/009/014
A161/A130

AUTHORS: Zalesskiy, V.I., Professor; Korneyev, D.M.; Okhrimenko, Ya.M.; Docents; Laguntsov, I.N., Senior Scientific Worker

TITLE: 5ХГС (5KhGS) die steel

PERIODICAL: Vestnik mashinostroyeniya, no. 4, 1960, 50 - 54

TEXT: The subject low-alloy steel for hot dies has been developed at the Moskovskiy institut stali (Moscow Steel Institute) and is by now produced by several plants. The process is standardized by TU 3657-53 (TU3657-53) specifications of Ministerstvo metallurgicheskoy promyshlennosti (Ministry of Metallurgical Industry). The chemical composition (in %) is: 0.45-0.55 C; 1.6-2.0 Cr; 0.9-1.1 Mn; 1.2-1.4 Si; up to 0.04 S, up to 0.04 P. The point in development was to eliminate the crack networks forming from alternating heat stresses in hot dies. Steels were compared not by their mechanical characteristics alone (σ_b, ψ, α_k) but also by the resistance to hot cracking. The method of heat effect tests was a novelty, and its authors V.I. Zalesskiy, D.M. Korneyev and Ya.M. Okhrimenko obtained Author's Certificate no. 75287, with priority from January 21, 1948. The new steel is modified chromansil. It is melted in a basic open-hearth

Card 1/3

S/122/60/000/004/009/014
A161/A130

5 ХГС (5KhGS) die steel

furnace. The following production process data are given: Forging in 1,150-850°C range; cooling in air; annealing in 850-870°C; quenching temperature 860-880°C, quenching in oil; tempering in 560-590°C. Hardness after tempering is HRC 38-42. The upper limit of quenching and tempering temperature relates to dies of larger dimensions (above 150 mm in diameter). The structure of this steel in the 860-880°C range is martensite. The variations of 5KhGS steel hardness with the diameter of specimens are illustrated in Figure 2. Its impact resistance at room temperature is lower than in the 5ХНМ (5KhNM), 5ХНВ (5KhNV) and 5ХНТ (5KhNT) die steels, but in high temperature it is equal with the other grades. In drop forging tests inserts of 5KhGS steel proved more durable than inserts of 5KhNV steel (in forging 14 parts out of 18 selected for test). The information includes test data tables and figures from an ENIIPP report of 1959 on practical application of 5KhGS steel. In the average, the durability of 5KhGS steel was 10% higher. It is recommended for use after shop tests at Moskovskiy zavod malolitrazhnykh avtomobiley, or MZMA (Moscow Low-Displacement Car Plant), 1 GPZ, GAZ and Chebarkulskiy Plant. Its dies do not contain scarce component elements, and it is twice cheaper than 5KhNB and 30% cheaper than 5KhNT. There are 3 figures, 8 tables and 2 Soviet-bloc references.

Card 2/3

S/122/60/000/004/009/014
A161/A130

AUTHORS: Zalesskiy, V.I., Professor; Korneyev, D.M.; Okhrimenko, Ya.M.: - Docents; Laguntsov, I.N., Senior Scientific Worker

TITLE: 5ХГС (5KhGS) die steel

PERIODICAL: Vestnik mashinostroyeniya, no. 4, 1960, 50 - 54

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5 ХГС (5KhGS) die steel

S/122/60/000/004/009/014
A161/A130

furnace. The following production process data are given: Forging in 1,150-850°C range; cooling in air; annealing in 850-870°C; quenching temperature 860-880°C, quenching in oil; tempering in 560-590°C. Hardness after tempering is HRC 38-42. The upper limit of quenching and tempering temperature relates to dies of larger dimensions (above 150 mm in diameter). The structure of this steel in the 860-880°C range is martensite. The variations of 5KhGS steel hardness with the diameter of specimens are illustrated in Figure 2. Its impact resistance at room temperature is lower than in the 5ХНМ (5KhNM), 5ХНВ (5KhNV) and 5ХНТ (5KhNT) die steels, but in high temperature it is equal with the other grades. In drop forging tests inserts of 5KhGS steel proved more durable than inserts of 5KhNV steel (in forging 14 parts out of 18 selected for test). The information includes test data tables and figures from an ENIIPP report of 1959 on practical application of 5KhGS steel. In the average, the durability of 5KhGS steel was 10% higher. It is recommended for use after shop tests at Moskovskiy zavod malolitrazhnykh avtomobiley, or MZMA (Moscow Low-Displacement Car Plant), 1 GPZ, GAZ and Chebarkul'skiy Plant. Its dies do not contain scarce component elements, and it is twice cheaper than 5KhNB and 30% cheaper than 5KhNT. There are 3 figures, 8 tables and 2 Soviet-bloc references.

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5 ХГС (5KhGS) die steel

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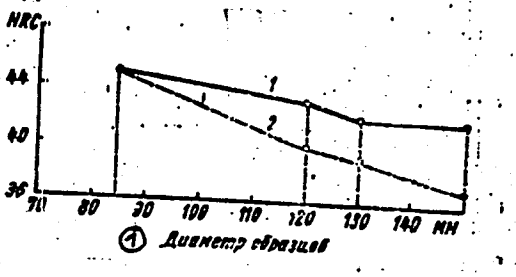
Fig. 2: Hardness of 5 ХГС (5KhGS) steel (after quenching and tempering) in specimens of different diameters. 1 - surface; 2 - core. (1) (Diameters in mm, from 70 to 140 mm).



Card 3/3

LAGUNTSOV, I.N., kand.tekhn.nauk; GINZBURG, E.S., kand.tekhn.nauk

Metal for principal models of new power equipment. Teploenergetika 7 no.5:3-12 My '60. (MIRA 13:8)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Steel) (Power engineering--Equipment and supplies)

S/104/60/000/011/001/001
E194/E484

AUTHORS: Akol'zin, P.A., Doctor of Technical Sciences;
Gulyayev, V.N., Candidate of Technical Sciences and
Laguntsov, I.N., Candidate of Technical Sciences

TITLE: Corrosion Cracking of Austenitic Steels in Thermal Power Installations With Super-High Steam Conditions

PERIODICAL: Elektricheskiye Stantsii, 1960, No.11, pp.29-32

TEXT: Austenitic steel parts of thermal power equipment have been subject to a special kind of corrosion in service; this takes the form of local corrosion cracks under stress. This article generalizes Soviet and German published work on this subject. In a once-through boiler with super-critical steam conditions of 300 atm and 600°C, corrosion cracking was observed during the conduct of special tests to investigate salt deposits for which purpose caustic soda, sodium chloride, sodium silicate and sodium sulphate were introduced into the feed water in amounts of 100, 200, 40 and 32 mg/litre respectively. The tests lasted for 3 to 4 hours with each solution. The steel in question was grade ЭИ-257 (EI-257) Damage of a transcrystallite character appeared on sections of pipework subject to severe stress. The damage occurred after about

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E194/E484

Corrosion Cracking of Austenitic Steels in Thermal Power Installations With Super-High Steam Conditions

6000 hours service, a number of other cracks were found and others continued to appear for some months. These defects were all associated with the tests on salt deposit formation. A number of operating troubles experienced at the Cherepet' Station are reviewed, here the rated steam conditions at the turbine stop valve are 170 atm 550°C. Damage due to corrosion under stress took place in the first period of operation in the convective part of the super-heater made of steel EI-257. The feed water conditions have since been modified and the trouble has now been overcome. The most serious cases of failure of tubes of austenitic steel under stress occurred in the West German Chemical Works of Hüls. Details of this case obtained from German published work are given. It is concluded that austenitic steels work quite reliably provided that proper allowance is made for their specific features including the tendency to corrosion cracking in aggressive media, low thermal conductivity, and high coefficient of linear expansion. Caustic soda and chlorides act as corrosive

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S/096/60/000/011/007/018
E194/E184

18.8300

AUTHORS: Laguntsov, I.N. (Candidate of Technical Sciences), Ratner, A.V. (Candidate of Technical Sciences), and Zelenskiy, V.G. (Engineer)

TITLE: The Causes of Rapid Wear in and Selection of Materials for Components of the Flow Parts of High-Pressure Feed Pumps

PERIODICAL: Teploenergetika, 1960, No 11, pp 55-59

TEXT: The main object of this article is to make practical recommendations about the materials to be used for various parts of high-pressure feed pumps together with some recommendations about the design; this is done on the basis of service and laboratory tests. Because of heavy wear experienced in high-pressure feed pumps at power stations, the All-Union Thermo-Technical Institute carried out investigations at six high-pressure power stations selected in such a way that it was possible to relate the performance of the feed pumps to the materials used in them and other design features. Particularly heavy wear is experienced in flow parts of the pumps including runners, guide vanes, glands and other parts. Not only pump design but also operating conditions

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S/096/60/000/011/007/018
E194/E184

The Causes of Rapid Wear in and Selection of Materials for Components of the Flow Parts of High-Pressure Feed Pumps

and quality of maintenance greatly influence the life of the pumps. In addition to making investigations at power stations, laboratory tests were made to investigate the resistance to erosion of a number of materials as function of such operating factors as length of test, width of test slot, temperature, rate of flow of medium, and so on. The tests were made on slotted specimens which imitate fairly well the conditions in feed pump glands. The tests were made with condensate from the super high-pressure boilers of the Institute. The erosion resistance of all the test materials was expressed as the ratio of the depth of wear of specimens of steel grade 1Kh18N9T (1Kh18N9T) to the depth of wear of specimens of the material tested under identical test conditions, and some 55 different test results are given in Fig 2. The erosion resistance of carbon steels and cast irons sometimes used in feed pumps is low, the erosion resistances of bronzes is better but not satisfactory. Satisfactory resistance to erosion was found in various chrome steels, chromium treated steels and sulphided steel.

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S/096/60/000/011/007/018
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The Causes of Rapid Wear in and Selection of Materials for Components of the Flow Parts of High-Pressure Feed Pumps

Certain stainless steels have very high erosion resistance. The rate of erosive wear as function of time was tested on a number of steels and the results for grade Cb. 20 (St. 20) are plotted in Fig 3. In a considerable number of steels at high rates of flow the rate of erosive wear is proportional to the third power of the rate of flow. The influence of temperature on rate of wear is shown by the graphs in Fig 4 and in general the rate of wear is directly proportional to the condensate temperature up to 200 °C. It was concluded from the work and from published data that the main cause of short feed-pump life is rapid erosive wear of components in the flow part. Accordingly, it is most important to select the materials to be used for such parts and also the rates of flow with great care. Typical design effects that can lead to heavy wear are also mentioned. The quality of the feed water has an important influence on the life of parts of cast iron, carbon steels and bronze. Increasing the loading on a pump increases the speed and alters the character of the flow and can lead to very heavy wear. Specific recommendations are then made about the

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The Causes of Rapid Wear in and Selection of Materials for Components of the Flow Parts of High-Pressure Feed Pumps

materials to be used in different parts of the pumps. Thus, the flow parts of pumps, depending on the rate of flow of water should be made of chromium (Cr = 13-20%) and chrome nickel steels. Steel 2Х13 (2Kh13) was particularly successful for runners and guide vanes but other hard chrome-nickel steels can also be satisfactorily used. Glands which are subject to mechanical wear as well as erosion present a difficult problem and it is recommended to use coatings made with electrodes grades ЦН-6 (TsN-6) or ЦН-2 (TsN-2), or steel ЭИ-481 (EI-481), steel 2Х13 (2Kh13), sulphided and chromium treated steel ЭИ-909 (EI-909). These materials resist mechanical and erosive wear. A number of other detailed recommendations are made about the kind of materials to use. The importance of good surface finish is emphasised. If attention is paid to all these measures the service life of high-pressure feed pumps may be greatly extended.
There are 4 figures.

ASSOCIATION: Vsesoyuznyy teplotekhnicheskiy institut (All-Union Thermo-Technical Institute)

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S/129/61/000/002/005/014
E073/E335

AUTHORS: Laguntsov, I.N., Candidate of Technical Sciences and Zlepko, V.F., Engineer

TITLE: Long-run Failure of Austenitic Steels

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1961, No. 2, pp. 24 - 27

TEXT: According to Oding and Ivanova (Ref. 1) and Creenwood (Ref. 3), failure of the metal occurs as a result of diffusion and coagulation of vacancies into micropores, which subsequently grow into microcracks. According to this hypothesis, loosening of the crystal structure will precede failure. Results obtained by Mirkin and Trunin (Ref. 4) on industrial heats and results of Oding (Ref. 5) support this view. The work described in this paper relates to investigating the influence of ageing on the process of failure of austenitic boiler steels. The experiments were carried out with the steels [illegible] (EI695R), [illegible] (1Kh18N12T) and [illegible] (EI257). Abstractor's note: compositions not stated. The steel EI695R was aged at 650 °C whilst the

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latter two steels were aged at 600 °C for durations of 100, 500, 1 000, 3 000, 7 000 and 15 000 hours. Prior to ageing a part of the metal was subjected to stretching by 8%, corresponding to the rate of strain at the point of bending of steam-tubes and steam-superheat tubes. After ageing, the specimens were tested for long-run strength at 28 kg/mm^2 at a temperature corresponding to the ageing temperature. For localising the zone of failure two drillings were made with a radius of 3 mm at the top. The diameter at the notch corresponded to the diameter of the smooth specimens. The microhardness was measured in the undamaged notch with loads of 50 and 20 g at distances of 1, 2 and 5 mm from the top. The small dimension of the indentation produced by a 20-g load enables direct measurement in the neighbourhood of the crack or at the grain boundary. The microhardness, as a function of the scattering values, was determined on the basis of 50-100 measurements with an error not exceeding 2%.

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Smooth specimens tested in the initial austenised state had transcrystalline fractures and no cracks could be detected visually on the surface. For the steel EI695R, the character of the failure did not change appreciably throughout the entire 15 000-hour period of ageing at 650 °C. A tendency was observed only to increasing the area of intergranular failure in the fracture and "smoothing-out" of an initially highly pronounced necking during the failure. Specimens of the steels 1Kh18N12T and EI257 tested after ageing at 600 °C for a period of 100 to 3 000 hours failed preferentially along the grain boundaries; at the surface a large quantity of cracks occurred. Prolongation of the ageing to 7000 to 15 000 hours leads to a decrease in the number of surface cracks and sections with intercrystallite failure appear in the fracture. However, regardless of the type of final failure, intercrystallite cracks will usually form near the fracture within the boundaries of one or several grains. Intercrystallite fractures were also observed in undamaged

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drillings; in the steels 1Kh18N12T and EI257 the inter-crystallite cracks were more extensive than in the steel EI695R. With increasing ageing the network of cracks at the surface of the drilling, prior to failure, is substituted by single cracks. The fracture of primarily deformed specimens is more transcrystalline than in undeformed specimens and surface intergranular cracks are less pronounced. The given data indicate that the character of failure of the steel changes with changes in the structure resulting from preliminary ageing. The first foci of failure are generated along the grain boundaries. With increasing degree and speed of the plastic deformation at the instant of rupture, the failure which begins along the grain boundaries can become extended into the body of the grain. Thus, a mixed fracture characterising transcrystalline failure is observed. The authors studied the microhardness (HV) as a function of the ageing time, hours, in the zone of development of inter-crystallite cracks. The results, Fig. 1 (Curves 1 relate to

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the grain boundary; Curves 2 relate to the centre of the grain; the top curves are for the steel Kh18N12T and the bottom curves are for the steel EI257) show that the speed of variation of the hardness in the centre and in the body of the grain differs. For the steels 1Kh18N12T and EI257 three ageing periods can be singled out, each with a specific ratio of the hardness in the centre to the hardness at the boundary of the grain. During the first period the two hardness values are approximately equal; in the second period, during which spontaneous decomposition takes place, the hardness at the grain boundary exceeds the hardness at its centre; in the third period, beginning with the time during which processes associated with coagulation occur, the grain boundaries are softer than the centre of the grain. For the steel EI695R the difference in the speed of change of the hardness between the body and the boundary of the gnains was less pronounced. The microhardness of the solid solution adjacent to the intercrystallite crack was appreciably lower

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both in the second and the third ageing period, regardless of whether the boundaries were work-hardened relative to the body of the grain. The width of the softened strip was on the average 80-100 μ and, with increasing ageing duration to 15 000 hours, there was a tendency for this strip to become wider. Fig. 2 shows the microhardness (HV) versus distance from the edge of the crack, μ in the zone of failure produced by a load of 28 kg/mm^2 at 600 °C. The individual plots refer to the following ageing and preliminary loading conditions: a - 600 °C, 1 000 hours; б - 600 °C, 3 000 hours; в - 600 °C, 15 000 hours; г - preliminary deformation + ageing at 600 °C, 3 000 hours; д - 600 °C, 500 hours; e - 600 °C, 3 000 hours; ж - in operation at 565-580 °C, 7 000 hours; з - in operation at 565-580 °C for 18 000 hours. The preliminary deformation of the metal brought about little change in the loosened volumes. However, a drop in the microhardness was observed not only in the aged but also in the

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austenized state; the microhardness of the steel EI257 is considerably lower in the neighbourhood of intercrystallite cracks and will be more pronounced with increasing service life of the material. The microhardness in the neighbourhood of the boundaries and in the body of the grain, aged under operating conditions, was approximately equal. Metallographic analysis of a large number of intercrystallite fractures has shown that failure develops directly at the point of contact of the grains and in the loosened zone. Fig. 3 shows a crack in the matrix near the grain boundary (steel EI257, tests with 28 kg/mm^2 at 600 °C, ageing for 15 000 hours at 600 °C, magnification 1000X). Fig. 4 shows the microcrack developing at the point of contact of the grains (magnification 25000X). Comparison of the intercrystallite fracture obtained for the same specimen indicates that apparently one type of failure can change into the other, depending on the strength of the boundaries and the speed of formation of microcracks in the boundary zone. In planes with the

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greatest tangential stresses, dislocation of the grains relative to each other is usually not along the boundaries but along the adjacent loosened zone. The twin character of the intercrystalline failure and the fact that the decrease in microhardness is independent of the strength ratio of the boundary and intracrystalline volumes of the grain indicate that intercrystalline failure of boiler steels is accompanied by the formation of micro-discontinuities at the point of contact of the grains. The following conclusions are arrived at:
1) long-duration ageing at 600-650 °C influences more the character of the failure of the steels 1Kh18N12T and EI257 than it does in the case of the steel EI695R.
2) Intercrystallite failure of the steels 1Kh18N12T and EI257 is accompanied by loosening of the body of the metal adjacent to the grain boundaries. The zone of loosening could be detected during the entire period of ageing

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S/129/61/000/002/005/014
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(100, 1 500 hours). In a metal that was preliminarily work-hardened by stretching by 8%. loosening was observed in the initial austenized state.
3) The character of the intercrystallite failure during long-run strength tests is governed by the strength relations at the grain boundaries and by the zone of loosening.
(Note: this is a complete translation.)
There are 4 figures and 5 references: 3 Soviet and 2 non-Soviet.

ASSOCIATION: Vsesoyuznyy teplotekhnicheskiy nauchno-issledovatel'skiy institut
(All-Union Heat-Engineering Scientific Research Institute)

Card 9/11

34533
S/659/61/007/000/020/044
D217/D303

18.1151

AUTHORS: Laguntsov, L.N., and Zlepko, V.F.

TITLE: Nature of fracture of austenitic boiler steels

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Issledovaniya po zharoprochnym splavam, v. 7, 1961, 196 - 201

TEXT: The influence of ageing on the nature of long-term fracture of the steels ЭИ 695Р (EI695R), 1Х18Н12Т (1Kh18N12T) and EI257 was studied. Prior to testing for long-term strength, the metal was aged for 100, 500, 1000, 3000, 7000 and 15,000 hours at 600 - 650°C Apart from ageing under laboratory conditions, the steels 1Kh18N12T and EI257 were aged under service conditions in electric power stations for 7000, 18,000 and 26,000 hours. The nature of fracture of specimens tested at a load of 28 kg/m^2 and at the appropriate ageing temperatures were determined by means of optical and electron microscopes. The strength of the fracture zone was estimated by microhardness measurements which were compared with those yielded by control specimens. The results of the measurements were compared

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with tests of the fracture zone for resistance against corrosion. It was found that prolonged ageing at 600 - 650°C exerts a noticeable influence on the nature of fracture of the steels 1Kh18N12T and EI257, and to a lesser degree with steel EI695R. The intercrystalline fracture of steels 1Kh18N12T and EI257 on testing for long-term strength is accompanied by embrittlement of the crystal lattice in regions adjacent to the grain boundaries. The brittle zone forms on ageing for 100 to 15,000 hours. The nature of intercrystalline fracture on testing for long-term strength depends on the relationship between the grain boundary strength and the brittle zone strength, both of which change during ageing. There are 4 figures, 1 table and 5 references: 3 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: J.N. Greenwood, J. Iron and Steel Inst., 2, 1952; G. Crussard and J. Friedel, Proceedings of metals at high temperatures, May-June, 1954.

X

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E7650

S/096/61/000/010/003/006
E071/E335

18.1151

AUTHORS: Laguntsov, I.N., Candidate of Technical Sciences and Mikhaylova, T.A., Engineer

TITLE: The structure and properties of austenitic heat-resistant steel [illegible] (EI-257) after prolonged service

PERIODICAL: Teploenergetika, 1961, No. 10, pp. 60 - 65

TEXT: A new type of heat-resistant austenitic steel, EI-257, was used in the construction of a heat-power station boiler (steam parameter: pressure 300 atm., temperature 600 °C) and systematic observations of the behaviour of steam pipes were made. The authors describe the results of evaluating the properties of the steel after 41 000 hours of operation. The chemical composition of metal after the above period was as follows, in %: C 0.10; Mn 0.60; Si 0.50; S 0.017; Cr 15.0; Ni 14.5; Mo 0.50 and W 2.80, which corresponds to the steel EI-257. The composition of the weld metal, in %, was: C 0.14; Mn 1.47; Si 0.2?; Cr 15.0; Ni 10.6 and Mo 2.1, which corresponds to an electrode of the type [illegible] T-1 (TsT-1).

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It was found that during ageing under operational conditions the structure of steel EI-257 undergoes considerable changes related to the transition from a homogeneous solid solution into a heterogeneous state. A prolonged ageing of approximately 20 000 hours contributed to the redistribution of secondary phases in the whole volume of the grains. This change in the structure was mainly responsible for changes in a number of properties of the EI-257 steel. In the course of ageing the solid solution was impoverished of chromium and other alloying elements. The contents of chromium and molybdenum in the carbide residue increased by a factor of 12 and 3, respectively, in comparison with the initial state. During service the strength and characteristics of the metal in respect of the initial state increase, and plastic properties decrease. After 20 000 hours of operation the above properties were noticeably stabilized. A fall in the impact strength of the metal during service from 38 to 15-16 kg·m/cm^2 was caused by an increase in the brittleness of the metal due to the formation of brittle σ-phase. During operation, the strength of the welded metal

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The structure and .....

in the welded seams, made with the electrode TsT-1, remained practically unchanged, i.e. 63 - 72 kg/mm^2. The impact strength of the welded metal decreased by 50% but, after only 10 000 hours service, it was stabilized at a level of 4.5 - 6.5 kgm/cm^2. Again, the cause of embrittlement is the presence of brittle σ-phase. During the period of service from 3 000 to 30 000 hours, the EI-257 steel showed a high tendency to intercrystalline corrosion. After 41 000 hours of service the steel showed a complete resistance to this type of corrosion, which is explained by structural changes related to the formation and redistribution of secondary phases. During the whole period of operation there was no intercrystalline-corrosion development in steam at a temperature of the superheated steam of 600 °C on the internal walls of the tubes or on welded seams. So far, laboratory tests of the steel on the resistance-to-creep have reached 75 000 hours, which is 75% of the service life. The creep rate during the period from 20 000 to 70 000 hours of the test varied from 0.3×10^{-7} - 0.84×10^{-7} mm/mm hour, which shows that the heat-

The structure and ....

resistant properties of the steel at 600 °C are satisfactory. The tests for long-term strength at 600 °C and various stresses after 41 000 hours of service confirmed the high heat-resistant properties of the aged metal. It was established that the stress, causing the destruction of the metal, noticeably increased with increasing service time. It is concluded that an austenitic steel with an appropriately chosen chemical composition, quality smelting, rational development of the composition and of the electrodes and welding technology can secure a reliable operation of steam pipes if the stresses in the pipes are retained within permissible limits.
There are 6 figures, 2 tables and 2 Soviet references.

ASSOCIATION: Vsesoyuznyy teplotekhnicheskiy institut
(All-Union Heat-engineering Institute)

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S/081/61/000/020/050/089
B107/B101

AUTHORS: Akol'zin, P. A., Gulyayev, V. N., Laguntsov, I. N.

TITLE: Corrosion cracking of austenite steels in thermal power stations

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 20, 1961, 260, abstract 20I153 (Sb. "Korroziya reaktorn. materialov". M., Atomizdat, 1960, 93 - 102)

TEXT: The authors describe several cases of corrosion cracking in austenite steels at heating-and-power stations observed on boilers under overcritical operation conditions (300 atm, 600°C). 1X18H9T (1Kh18N9T) steels was found to be suited for the production of heating-and-power station equipment. It is, however, necessary to control conditions and quality of the water, and take account of the specific properties of austenite steels.
[Abstracter's note: Complete translation.]

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34395
S/695/61/000/000/001/005
B139/B104

18.1151

AUTHORS: Gura, P. M., Laguntsov, I. N., Ratner, A. V.

TITLE: Experience with austenitic boiler plate steels

SOURCE: Gorshkov, A. S., V. Ye. Doroshchuk, and N. V. Kuznetsov, eds. Povysheniye parametrov para i moshchnosti agregatov v teploenergetike; sbornik statey. Moscow, Gosenergoizdat. 1961, 92 - 103

TEXT: The authors compile the experience made with steam lines and superheaters from austenitic steels (Table 1). Experiments were conducted: (1) on a steam boiler of the TETs VTII at 300 at and 600°C. The bends of the superheater tubes showed no defects after 40,000 operational hrs. Intercrystalline cracks developed at various welded joints of the steam lines. The structure of the ЭИ-257 (EI-257) steel which was used, greatly changed after extended effect of the operational temperature. The molybdenum and chromium content in the carbides increases with the time. Formation of α- and σ-phases and deterioration of the mechanical properties occur. (2) Experiments on superheater tubes in the

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boilers of the pervaya promyshlennaya GRES (First Industrial GRES). Steam temperature at the exit of the third stage is 565 - 570°C Tubes from EI-257 steel, in one case from 1 X 18 H 12T (1Kh18N12T) steel, length of test for EI-257 37000 hrs, for 1Kh18N12T 15000 hrs. A carbide phase was formed and chromium and partially molybdenum passed from the solid solution into the carbides. The test of the welded joints at 600°C showed that their fatigue strength is the same at 100,000 hrs as that of the basic material (σ_f = 12 kg/mm^2). At the welded seams, cracks occasionally occur which may be traced to imperfect welding methods. In order to determine the weldability, the contraction of the test rods after heating to 1260°C must be determined. Moreover, the welding technology must be improved. There are 10 figures and 3 tables.

Table 1. Chemical composition and heat stability of the steels investigated. Legend: (1) brand of steel; (2) use; (3) chemical composition in %; (4) resistance to heat; (5) yield point σ_y, kg/mm^2 at C = 1 % for 100,000 hrs; (6) fatigue strength σ_f at 100,000 hrs; (7) superheater tubes, steam lines; (8) steam superheater tubes, steam lines.

Card 2/2

LAGUNTSOV, I.N., kand.tekhn.nauk; GREBENNIKOVA, T.T., inzh.; KURNOSOVA, N.D., tekhnik

Brittle breakdown of pipes in electric power plants with high-pressure parameters. Elek. sta. 33 no.10:33-35 O '62. (MIRA 16:1)

(Steampipes)

VINOGRAD, M.I., kand.tekhn.nauk; GONCHARENKO, M.S., inzh. [deceased]; DOROHIN, V.M., inzh.; TOPILIN, V.V., inzh.; CHERNINA, B.G., inzh.; Prinimali uchastiye: SHEYN, A.S., kand.tekhn.nauk; GORSKIY, V.N., inzh.; ARKHIPOVA, V.P., inzh.; LAGUNTSOVA, Ye.V., inzh.; KISELEVA, S.A., inzh; RYBAKOVA, V. Ya.,inzh.; BYSTRIKOVA, I.N., tekhnik; BURDYUCHKINA, Ye.P., tekhnik; SOLODIKHIN, I.P., tekhnik.

Improving the process of making EI347 steel for bearings. (MIRA 14:5)
Stal' 21 no.6:543-546 Je '61.

1. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii i zavod "Elektrostal'."
(Bearing metals)

ORLOVSKIY, Leonid Valerianovich; LAGURINA, Ye.V., red.; RAKITIN, I.T., tekhn. red.

[To live not less than a hundred..] Zhit' cheloveku ne men'she sta... Moskva, Izd-vo "Znanie," 1963. 47 p. (Narodnyi universitet kul'tury: Fakul'tet zdorov'ia, no.12)
(MIRA 17:1)

LAGUSHEV, S. S. (USSR)

"The hormonal balance and reaction of mammary epithelium in female mice of the C_3H and C_{57} strain."

report submitted for the European Conference on Tumor Biology (VICC), Warsaw, Poland
22-27 May 1961

Lagushev, S. S.-Inst. of Experimental Biology, Baltijsky Street 8, Moskva

JINDRA, A.; LAGUSOVA, H.; SIPAL, Z.

Hydroxylation of mebrophenhydramine in vitro. Cesk. farm. 11 no.3: 126-129 Mr '62.

1. Katedra biochemie Karlovy university, Praha a Katedra biochemie a mikrobiologie farmaceuticke fakulty University Komenskeho, Bratislava.

(ANTIHISTAMINICS chem)

LAGUTA, A. F.

Cattle - Moscow (Province)

Raising the young of Brown Latvian cattle scientifically. Sots. zhiv. 14 no. 4:20-25 ap '52

Monthly List of Russian Accessions, Library of Congress, July 1952. Unclassified

LAGUTA, A. F.

"Sugar Beet Feeding and Its Effect on Milk Fat." Cand Agr Sci, (No Inst Given), Moscow, 1954. (RZhBiol, No 2, Jan 55)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (13)
SO: Sum, No. 598, 29 Jul 55

LAGUTA, A.F.

Q-4

USSR/Farm Animals - Small Horned Stock.

Abs Jour : Ref Zhur - Biol., No 1, 1958, 2598

Author : A.F. Laguta, L.P. Nechiporuk

Inst :

Title : The Digestive and Nutrient Aspects of Hay-Flour.

Orig Pub : Zhivotnovodstvo 1957, No 5, 47-50

Abstract : Three groups of wethers were used for two experiments in which they were fed briquets of hay-flour which were obtained from the drying establishement of VISKhOM (Sovkhoz "Komunarka", 1955, 1st experiment). The briquets in the first experiment consisted of clover, lucerne, viko-oats mixture. In the second experiment the briquets consisted of lucerne, viko-oats mixture and green corn. The last mentioned briquets were obtained from the imported drying plant GDR [may mean Germanskaya Demokraticheskaya Respublika - German Democratic Republic i.e. East Germany].

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LAGUTA, A. F.

USSR/Farm Animals. Domesticated Fowl. Q

Abs Jour: Ref Zhur-Biol., No 20, 1958, 92648.

Author : Laguta, A.F., Levin, N.M.
Inst :
Title : Artificially Dried Hay Meal in Chicken Feed.

Orig Pub: Ptitsevodstvo, 1957, No 9, 34-35.

Abstract: The chickens of the first group were fed with artificially dried alfalfa meal, a principal source of vitamin A. For the first week each received 0.1-0.3 g, at 30 days and older, each got 3-4 g every 24 hours. Chickens of the second group up to 60 days old received vitamin A (400 i.u. each), D_2 (496 i.u. each), B_2 (100 γ apiece) and 0.5 g of fish oil (200 i.u.) per head and

Card : 1/2

LAGUTA, A.F., kand.sel'skokhozyaystvennykh nauk

Unused capacities for the production of feeds rich in proteins and vitamins. Zhivotnovodstvo 21 no.5:22-26 My '59. (MIRA 12:7)

(Hay)

L 38142-66

ACC NR: AP6018788 (A) SOURCE CODE: UR/0416/65/000/012/0042/0046

AUTHOR: Krikunenko, V. (Major general, Member of quartermaster service); Laguta, M. (Lieutenant colonel, Engineer)

ORG: none

TITLE: Feeding troops during winter training exercises

SOURCE: Tyl i snabzheniye sovetskikh vooruzhennykh sil, no. 12, 1965, 42-46

TOPIC TAGS: food preservation, food technology, food service equipment, MILITARY TRAINING

ABSTRACT: This article discusses the selection, storage, transportation, protection of food, and the preparation of hot meals during winter training exercises in the far north. It includes the method of setting up, camoflaging and using field kitchens for the preparation of hot meals under extremely cold weather conditions and the problem of distributing hot food in view of decreased mobility of snow tractors and vehicles. Orig. art. has: 3 figures, 1 photograph.

SUB CODE: 06,15/ SUBM DATE: none

Card 1/1 MLP

MORGUNOV, V.P.; gornyy inzh.; RYSIN, B.R., gornyy inzh.; LAGUTA, N.K., gornyy inzh.

Mine schools for the exchange of advanced practices. Ugol' Ukr. 4 no.9:44-46 S '60. (MIRA 13:10)
(Mining engineering--Study and teaching)

LAGUTA, Ye.F., aspirant.

Silage and hay meal for Vitamin A in rations for hens.
Ptitsevodstvo 9 no.2:23-25 F '59. (MIRA 12:3)

1.Vsesoyuznyy institut zhivotnovodstva.
(Poultry--Feeding and feeding stuffs)
(Vitamins-A)

1. V. P. LAGUTENKO, Eng.

2. USSR (600)

4. Buildings - Prefabricated

7. Factory-made assemblies for multi-storied housing construction. Gor.khoz. Mosk. 23 no. 9. 1949.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

LAGUTENKO, V.P., inzhener.

For further mastery of industrialized methods of apartment house construction. Gor.khoz.Mosk. 24 no.4:1-10 Ap '50.(MLRA 7:10)
(Moscow--Building) (Building--Moscow) (Precast concrete construction)

LAGUTENKO, V.P., inzhener.

Progressive use of fabricated building materials in housing construction. (MLRA 6:11)
Gor.khoz.Mosk. 25 no.2:11-14 F '51. (Building materials)

LAGUTENKO, V.P.

New construction design for flat roofs. Gor.khoz.Mosk. 25 no.9:13-16 S '51. (MLRA 6:11)

(Roofs)

1. Glavnyy inzhener instituta "Mosproyekt."

LAGUTENKO, V.

Panel-shell buildings Moskva Moskovskii rabochii, 1952. 77 p. (52-66747)

TH2201.L33

1. V. P. LAGUETENKO

2. USSR (600)

4. Apartment Houses

7. Industrial construction of multi-storied residential buildings. Gor.khoz. Mosk. 26. no. 12. 1952.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

LAGUTENKO, V.
"Construction and architecture of buildings with a skeleton structure from assemblable parts." (p. 10)
ARKHITEKTURA I STROITELSTVO
(Ministerstvo na stroezhite i putishtata, Ministerstvo na kom. nalnoto stopanstvo i blagoustroistvoto, i Naushno tekhnicheskiia suiuz) Sofiya Vol 3 No 10 1953

SO: East European Accessions List Vol 2 No 7 Aug 1954

LAGUTENKO, V.P., inzhener.

Wall design in frame and panel type houses. Gor.khoz.Mosk. 27 no.10:10-15 O '53. (MLRA 6:11) (Walls)

LAGUTENKO, V., laureat Stalinskoy premii; RAZINKOV, P., redaktor; IGNAT'YEVA, A., tekhnicheskiy redaktor.

[Large concrete slabs in apartment house construction] Zhilye zdaniia iz krupnykh panelei. [Moskva] "Moskovskii rabochii," 1954. 117 p. (MLRA 7:11)

(Precast concrete construction)

LAGUTENKO, V.P., inzhener.

Some problems in planning building elements; on the third anniversary of the scientific and technical conference on housing and public building construction. Gor.khoz.Mosk.28 no.2:1-2 F '54. (MLRA 7:5)
(Buildings, Prefabricated)

LAGUTENKO, V.P.

KRASNOPOLOV, B.P., inzhener; LAGUTENKO, V.P., inzhener

A new type crane is needed for mechanized construction. Mekh.stroi 12 no.9:22-24 S '55. (MLRA 8:11)
(Cranes, derricks, etc.)

LAGUTENKO, V.P., inzhener; GOKHBAUM, A.I., inzhener; LIPKIN, G.Ya., inzhener.

Make efficient use of material in structural units for buildings. Ger.khoz.Mosk.30 no.1:11-15 Ja '56. (MLRA 9:6)

1.Institut "Mosproyekt".
(Building materials)

LAGUTENKO, V.P., inzhener; KRASNOPOLOV, B.P., inzhener.

Dismountable-rotary crane for precast concrete housing construction. Gor.khoz.Mosk. 30 no.2:30-32 F '56. (MLRA 9:6)
(Cranes, derricks, etc.)

LAGUTENKO, V.P., inzhener.

New design of an apartment house. Gor.khoz.Mosk. 30 no.11:8-13 N '56.
(MLRA 10:3)

(Moscow--Apartment houses)

LAGUTENKO, V.P.

Economical lightweight construction elements are needed. Na stroi. Mosk. 1 no. 5:12-13 My '58. (MIRA 11:8)

1. Glavnyy inzhener Arkhitekturno-planirovochnogo upravleniya Mosgorispolkoma.
(Moscow--Precast concrete construction)

SOV/97-58-7-2/10

AUTHOR: Lagutenko, V. P. Member - Corresponding Member, ASiA SSSR

TITLE: The Efficient Use of Reinforced Concrete in Housing (Polnotsenno ispol'zovat' zhelezobeton v zhilishchnom stroitel'stve).

PERIODICAL: Beton i Zhelezobeton, 1958, Nr.7. pp. 243 - 249. (USSR).

ABSTRACT: Example of economical use of concrete can be seen when multi-hollow floor slabs are used. These hollow slabs are 11.7 cm thick when the hollows are circular and 10 cm thick when the hollows are oval shaped. The crushing strength of concrete is 200 kg/cm^2, the limit of elasticity = 3,500 - 4,500 kg/cm^2. In early days reinforced concrete was used very uneconomically due to its own excessive weight, e.g. when a house was calculated for 750 kg/m^2 of load to floors of flats only 150 kg is the superimposed load, the remaining 600 kg is the own weight of construction. The tendency nowadays is to reduce the weight of construction. A further reduction of weight of construction is made by reducing the thickness of partitions. 1 cm saved on a partition adds 0.4% to the floor area. When the thickness of partition is reduced from 10 cm to 7 cm, the floor area increases by 1.2%, and a 30% saving in material is achieved. Considerable troubles are caused

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The Efficient Use of Reinforced Concrete in Housing.

due to the fact that the factory-made units are only semi-finished. The difficulties with these semi-products are obviated when large size building elements are used. In modern factories reinforced concrete units are manufactured up to 7 m long and 4½ m wide. The capacity of lifting machines allow to increase the weight of these units up to 3 - 5 tons. With old constructions, the sizes of units varied between ¼, 1/3rd and ½ of the size of the rooms. This increased assembly work and number of joints. Therefore, the tendency is for large thin reinforced concrete units where great economy in material, labour and cost is achieved. A construction using load-bearing partitions does not seem now very economical in comparison with thin large size partitions which are calculated to resist bending. The thin partition from reinforced concrete of the size of the room behaves like a beam, and is able to substitute a girder, column and an ordinary lightweight partition. This partition, instead of being carried, is a load-bearing unit. Constructions using these partitions have the following advantages: saving of reinforced concrete up to 0.3 m^3/m^3 of floor area, at the same time the material so used has a load-

The Efficient Use of Reinforced Concrete in Housing.

bearing function; time of assembly is reduced due to the large sizes and small number of units; it is considerably labour-saving; the total weight of a house using the above construction, in comparison with a brick-built one, is reduced three times. Reduction of the number of variations in types of elements and equalisation of their weight lowers the cost of this construction by 20%. This method of construction is still under development to achieve further economies. Fig.1 shows a typical project of a block of flats in Moscow, plan and section of which are illustrated in Figs. 2 and 3. Fig.4 illustrates reinforced concrete floor slab covering the whole floor of the room in one unit. Fig.6 shows thick reinforced concrete partition designed as a load-bearing unit. The following technical advances have been made in this building system: (1) There are no internal walls in basement and, therefore, no foundations under them. The floor above is calculated as suspended floor. (2) The partitions are highly finished and do not need further attention; (3) Normal accoustical treatment is achieved by suspended ceilings and self-carrying

LAGUTENKO, V.P.

New methods determine success in building apartment houses.
Transp. stroi. 8 no.8:13-15 Ag '58. (MIRA 11:9)

1. Chlen-korrespondent Akademii stroitel'stva i arkhitektury SSSR.
(Apartment houses)

LAGUTENKO, V.P.

Efficient solution of structural problems is the basis of economical construction. Trudy MIEI no.9:48-60 '58. (MIRA 11:6)

1.Glavnyy inzhener Arkhitekturno-planirovochnogo upravleniya Moskvy.
(Apartment houses)

LAGUTENKO, V.P.

LAGUTENKO, V.P.

Construction elements for apartment houses. Gor. khoz. Mosk. 32 no.1: 10-12 Ja '58. (MIRA 11:1)

1. Glavnyy inzhener Arkhitekturno-planirovochnogo upravleniya Mosgorispolkoma.
(Moscow--Apartment houses) (Precast concrete construction)

LAGUTENKO, V.P.; BEREST, A.A.; SUSNIKOV, A.A.

Using thin-walled reinforced concrete in building apartment houses. Gor. khoz. Mosk. 32 no.6:5-9 Je '58. (MIRA 11:7)

1.Glavnyy inzhener Arkhitekturno-planirovochnogo upravleniya Mosgorispolkoma (for Lagutenko). 2. Zamestitel' nachal'nika Nauchno-issledovatel'skogo instituta tekhnologii i organizatsii proizvodstva aviatsionnoy promyshlennosti Gosudarstvennogo komiteta po aviatsionnoy tekhnike pri Sovete Ministrov SSSR (for Berest). 3.Glavnyy inzhener instituta "Giprostrommash" (for Susnikov).
(Moscow--Apartment houses) (Precast concrete construction)

LAGUTENKO, V.P., inzh., Geroy Sotsialisticheskogo Truda; FOMIN, G.N., inzh.; TESLER, P.A., kand.tekhn.nauk, nauchnyy red.; TYULENEVA, L.M., red.izd-va; RYAZANOV, P.Ye., tekhn.red.

[Large-panel houses of thin-walled units; introduction of the first experimental house] Krupnopanle'nye doma iz tonkostennykh konstruktsii; iz opyta vozvedeniia pervogo eksperimental'nogo doma. Moskva, Gos.izd-vo lit-ry po stroit., arkhit. i stroit.materialam, 1960. 103 p. (MIRA 14:4)
(Precast concrete construction)
(Apartment houses)

LAGUTENKO, Yu.P.

Microscopic anatomy of some systems of organs of the chicken mite Dermanyssus Gallinae (Gamasoidea, Dermanyssidae). Zool. zhur. 41 no.6:840-853 Je '62. (MIRA 15:7)

1. Zoological Institute, Academy of Sciences of the U.S.S.R., Leningrad.
(Chicken mite) (Insects--Anatomy)

LAGUTENKO, Yu.P.

Characteristics of the anatomy of the female sexual system in the chicken mite Dermanyssus gallinae (Gamasoidea, Dermanyssidae). Dokl.AN SSSR 145 no.5:1171-1173 '62. (MIRA 15:8)

1. Zoologicheskiy institut AN SSSR. Predstavleno akademikom Ye.N. Pavlovskim.
(Generative organs, Female) (Chicken mite)

LAGUTENKO, Yu. P.

Functional anatomy of the mouthparts of the chicken mite Dermanyssus gallinae Redi, 1674 (Gamasoidea, Dermanyssidae). Ent. oboz. 41 no.4:827-838 '62. (MIRA 16:1)

1. Zoologicheskiy institut AN SSSR, Leningrad.

(Chicken mite) (Insects—Anatomy)

LAGUTENKO, Yu.P.

Functional and histological features of the gonotrophic cycle of the chicken mite Dermanyssus gallinae (Gamasoidea, Dermanyssidae). Med. paraz. i paraz. bol. 32 no.3:313-319 My-Je '63

1. Iz Zoologicheskogo instituta AN SSSR.

LAGUTENKO, Yu.P.

Functional and morphological characteristics of the digestive and excretory systems of some gamasid mites (Parasitiformes, Gamasoidea) as related to the nature of their parasitism. Zool. zhur. 43 no.12:1773-1783 '64 (MIRA 18:2)

1. Zoologicheskiy institut AN SSSR, Leningrad.

LAGUTENKOVA, N.S.; KOROLYUK, I.K.

Lithology and the organic remains of some Lower Bavly dolomites in the western part of Bashkiria. Izv. vys. ucheb. zav.; geol. i razv. 6 no.4:66-76 Ap '63. (MIRA 16:6)

1. Institut geologii i razrabotki goryuchikh iskopayemykh.
(Bashkiria—Dolomite)

LAGUTENKOVA, N.S.

Traces of volcanic activity in sediments of the Upper Bavly series in Perm Province and the Bashkir A.S.S.R. Dokl. AN SSSR 150 no.6:1352-1355 Je '63. (MIRA 16:8)

1. Institut geologii i razrabotki goryuchikh iskopayemykh.
(Perm Province--Volcanic ash, tuff, etc.)
(Bashkiria--Volcanic ash, tuff, etc.)

KOROLYUK, I.K.; LAGUTENKOVA, N.S.

New finds of microscopic problematic organic remains in Bavly sediments. Dokl. AN SSSR 161 no.2:455-458 Mr '65. (MIRA 18:4)

1. Institut geologii i razrabotki goryuchikh iskopayemykh. Submitted July 13, 1964.

LOGVINENKO, N.V.; KARPOVA, G.V.; KOSMACHEV, V.G.; LAGUTIN, A.A.

Organic carbon in the Taurian flysch formation of the Crimea. Dokl. AN SSSR 150 no.5:1140-1143 Je '63. (MIRA 16:8)

1. Khar'kovskiy gosudarstvennyy universitet im. A.M.Gor'kogo. Predstavleno akademikom N.M.Strakhovym.
(Crimea—Bitumen)

KOSMACHEV, V.G. [Kosmachov, V.H.]; LAGUTIN, A.A. [Lahutin, A.A.]

Distribution of organic carbon in the Middle and Upper Jurassic terrigenous sediments in the northwestern margin of the Donets Basin and the western part of the Dnieper-Donets Lowland. Dop. AN URSR no.3:372-375 '64.
(MIRA 17:5)

1. Khar'kovskiy gosudarstvennyy universitet. Predstavleno akademikom AN UkrSSR O.S. Vyalovym.

LAGUTIN, B. L.

"Methods for Calculating the Ice Crossings," Works of Sci-Res Institution Main Administration of the Hydrometeorological Service USSR, SeriesV, No 20, 1946 (39-49)

Rpt. U 3213, 3 Apr 53,

231T75

USSR/Meteorology - Oceanographic Equipment

Sep 52

"Technical Equipment for Oceanographic Research," B. L. Lagutin, State Oceanographic Inst Moscow

"Meteorol i Gidrol" No 9, pp 48-51

States that methods and tech equipment for oceanographic research have not been improved for decades. Notes that this topic was already raised by N. A. Belinskiy, Yu. V. Istoshin and P. P. Nikiforov (cf. "Meteorol i

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Gidrol" No 11, 1951). Author states that he intends to prove usefulness of modern equipment, in particular of self-recorders measuring currents at sea.

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LAGUTIN, B. L.

LAGUTIN, B.L.

124-57-1-572

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 1, p 72 (USSR)

AUTHOR: Lagutin, B.L.

TITLE: Methods and Instruments for the Study of Ocean Currents (Metody i pribory dlya izucheniya techeniy v more)

PERIODICAL: Tr. Gos. okeanogr. in-ta, 1955, Nr 30, pp 13-92

ABSTRACT: Means for instrumentational study of ocean currents are described, and a comparative appraisal of these means is offered with regard to the circumstances of their application and the purpose of a given investigation. From the experience of separate expeditions, performed in different geographic circumstances, certain more practicable ways of utilizing both methods and instruments in the observations of the currents are traced. The various methods of determination of currents are discussed in detail, namely, by navigational, drift, (rotary) current-meter, and geoelectromagnetic means. Special attention is focused on the investigations of the accuracy of these methods. The advantages of the use of self-contained automatic recorders are pointed out, together with ways of overcoming the inherent difficulties of their use.

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S.V. Nemchinov

1. Ocean currents--Study and teaching 2. Ocean currents--Recording devices

LAGUTIN, B.L.

USSR/Physics of the Hydrosphere - General Problems, N-1

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 36227

Author: Lagutin, B. L., Rybnikov, A. A.

Institution: None

Title: Preparation of Glasses for the Thermobathigraph

Original Periodical: Meteorol. i gidrologiya, 1956, No 1, 52-53

Abstract: Several methods were tested for coating glasses for the thermobathigraph. It was established that the simplest and most reliable method is to smoke the glass, using the procedure described in the article.

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DUVANIN, A.I.; LAGUTIN, B.L.

Remarks on an article by K.K.Giul' and V.M.Zhirnov. Meteor. i gidrol. no.7:52-53 Jl '56. (Oceanography) (MLRA 9:10)

LAGUTIN, B.L.

LAGUTIN, B.L.

Layout of work organization in the study of sea currents and some results of these studies. Trudy GOIN no.40:65-90 '57. (MLRA 10:7)

(Ocean currents)

IAGUTIN, B.L., SYSOYEV, N.N.

Conference on oceanographic instruments. Biul. Okean. kom. no.4: 5-13 '60. (MIRA 13:7)
(Oceanographic instruments--Congresses)